Sample Analysis Report
for
75 Ted Turner Dr SW

Air Allergen

& Mold Testing, Inc.

September, 2017

Contents

Date of Sample 9/27/2017 **Date of Report** 09/28/2017
Company Synergy Development Partners LLC
Name Ralph Phillips
Address 75 Ted Turner Dr SW
City Atlanta **State** GA **Zip** 30303
Phone 404 771 7998
Email rphillips@synergydp.com **JobID** 15994

Site Information

Property Description: Multi-story government building with no basement or crawlspace and stone exterior.

Background Information

A leak from the HVAC system wetted the carpet in the central office. Air Allergen and Mold Testing was asked to perform sampling and make suggestions based on the findings. This written report summarizes the findings and provides general guidelines to prevent the future buildup of spores and other particulate. For additional information regarding the basis of these guidelines, see the attachments to this report.

Sampling & Suggested Guidelines

Sampling: Spore trap analysis of fungal spores & other airborne particulates by optical microscopy.

Suggested guidelines: We currently use the following guidelines condensed from multiple sources when considering the significance of samples taken during an inspection. *Humidity:* Less than 55% at 70 degrees. *Background particulate:* (1) Total particulate count fewer than 100,000 /cubic meter; (2), no insulation or glass-like fibers. *Skin Fragments:* 0-25 % of slide. *Spores:* (1), Spore type and percentage profile similar to outdoor air; (2), Total spore count under 2,500 spores per cubic meter providing that the Aspergillus/Penicillium spores are under 500 spores per cubic meter; (3) No spores requiring wet conditions. *Carpet dust analysis:* (1), Total CFU's/gram under 40,000; (2), minimal spore types found on the EPA's Environmental Relative Moldiness Index (ERMI) list; (3), minimal spores associated with elevated humidity. *Tape Swab Bulk analysis*: No water damage organisms present.

How the Report is Organized

The following Lab Analysis Summary Chart shows which, if any, findings are above our cited guidelines. Those findings above our guidelines are shown in red. The guidelines are not intended to be absolute, but rather give a

frame of reference for evaluating the samples. The farther the results of individual samples are above these guidelines, the more likely health symptoms will occur with the occupants.

Following the summary chart are sections titled Sample Details where each sample is listed separately with details about the lab findings, significance of the findings, inspector's observations, and any suggestions for the area where the samples were taken.

The next section of the report titled Maintaining Indoor Air Quality gives general information about maintaining the indoor air quality. Following the Summary statements is an explanation of how the guidelines were established in the section titled General Information Concerning Mold.

Following the general information are sections titled Remediation Guidelines and Safety Precautions that provides information about remediation methods and concerns, and Studies Relevant to Indoor Air Quality that support the importance of investigating indoor air quality. The full Lab Report is attached as a separate PDF.

Lab Analysis Summary Chart

Samples Taken	RH	Background Particulate from Air samples			Spores from Air Samples				Carpet Dust		Tape Swab Bulk
Suggested Guidelines	Less than 55% at 70 ° F	Total BP Count Below 100,000	No Insul/ Glass Fiber	Percent Skin 0-25%	Profile Similar to outside	Spore Total Less than 2,500	High Probability Allergen Spores less than 500	No Water Damage Spores Present	Total CFU's less than 40,000	ERMI & Water Damage Less than 10,000	No Water Damage Organisms Present
Outside	**71**	**348,578**	**Yes**	**0-25**	**No**	**21,224**	**1,135**	**ND**	**N/A**	**N/A**	**N/A**
Command Center	52	218,142	ND	51-75	Yes	2,270	785	262	N/A	N/A	N/A

Red=outside of suggested guidelines.* Relative humidity ** Overloaded ND=None Detected

Sample Results, Outdoor Spore Counts

Outside

Total Spore Count per Cubic Meter: 21,224
High Probability Allergy: 1,135
Hyphal Fragment: 305
Skin Fragment: 0-25
Particulate: gypsum board, soil, carbon
Fiber: cellulose, glass like, insulation
Background: 348,578
Humidity: 71 %
Temperature: 76 ° F
Liters of air sampled: 75
Comments: Outside samples provide a control to compare the inside samples against. There are mold spores everywhere in the outdoor

environment, and the kinds and numbers of spores can vary from day to day and hour to hour. It is normal to expect some of those spores will find their way inside. However, if the inside count exceeds the outside count, or if the kinds of mold found indoors is different than those outside, then it is presumed that the mold spores are being generated inside.

Eighty-one percent of the spores in the outside sample are Basidiospores. Basidiospores are common in the outdoor air but do not normally grow indoors. Therefore, the Basidiospores count can be helpful in comparing the percentages of spores in the indoor samples that come from the outdoors.

Two percent of the spores in this sample are Ascospores. Ascospores are found everywhere in nature.

Ten percent of the spores in this sample are Cladosporium, which is common in the outdoor air, especially in areas with significant vegetation.

Five percent of the spores are Aspergillus/Penicillium. The lab does not make a distinction between Aspergillus and Penicillium because they are so similar in size and appearance. Information on these and other spores found in the samples is attached at the end of this report.

The inspector did not note any surface water drainage issues affecting the building. No water damage to the exterior of the building was noted by the inspector. The gutters were reported to be acceptable.

Sample Results: Indoor Spore Counts

Command center

Total Spore Count per Cubic Meter: 2,270
High Probability Allergy: 785
Hyphal Fragment: 87
Skin Fragment: 51-75
Particulate: soil, carbon
Fiber: cellulose
Background: 218,142
Humidity: 52 %
Temperature: 73 ° F

Comments: The total spore count in this air sample is within the cited guideline of less than 2,500 spores per cubic meter.

The count of Aspergillus/Penicillium, considered a high probability allergy spore and often used as an indicator of mold growth in the indoor environment, is above the cited guideline of less than 500 spores per cubic meter. There are a significant number water damage spores in this sample.

The background particulate is well above the cited guideline. The amount of skin fragments is well above the cited guideline. The humidity is within the cited guideline.

Mold growth and spore production is significantly retarded when humidity is held near or below fifty percent. Regular use of the HVAC system can be helpful to reduce humidity in the indoor air. However, during periods of the year when the HVAC system is not sufficient to maintain the humidity at this level, consider adding dehumidifiers.

There was a leak from the HVAC unit that flooded and wetted the carpet and base of the walls in the command center. The inspector noted large water stains on the carpet tiles which, he was told, would be removed. The inspector also noted suspect microbial growth on the base of the drywall behind the shoe molding. Make sure all causes of water intrusion or moisture damage are properly repaired before remediation is initiated.

Some of the ceiling tiles were stained or damaged. The area above the ceiing should be inspected to determine and eliminate the source of the damage. Any stained or damaged wood above the tiles can be cleaned with a fungicide, vacuumed with a HEPA filter vacuum, and sealed with an encapsulant. Metal surfaces above the tile can be wiped with a fungicide to remove any latent spores. Stained or damaged tiles should be replaced.

Drywall or other materials with a light dusting of mold can be wiped with a mild fungicide and vacuumed with a HEPA filter vacuum. Drywall or other materials with obvious visible mold should be cleaned with a fungicide, lightly sanded, vacuumed with a HEPA filter vacuum, and sealed with an encapsulant. Additional information about remediation can be found in the section of this report titled Remediation Guidelines and Safety Precautions

The floor is carpeted; however a carpet dust sample was not taken. Air samples provide information about airborne spore counts and background particulate at the time of the inspection while carpet dust analysis gives historical insight into intermittent events that can be helpful in managing the indoor air quality. It is important to note that suggestions made without complete information may result in more or less work than would otherwise be suggested. Please see the notes about carpet in the section titled Maintaining Indoor Air Quality.

For potential health relevance and to compare the results of the samples in this report with similar samples taken from thousands of other properties, please refer to the section of this report titled ‘Interpreting Sample Results’.

Sample Results: Background Particulate

The background particulate in the command center air sample is above the cited guidelines. Elevated background particulate can result in respiratory

discomfort similar to allergy symptoms. Background particulate is removed by the filter in the HVAC system and can be reduced by improved filtration through the use of a higher rated filter and/or by operating the HVAC system fan in the ON position rather than AUTO.

There is at least a trace of insulation or glass-like fibers in the sample from the outside. In some instances, insulation and other particulate in the indoor air occurs as a result of construction work or an entrance to an unfinished area being opened, in which case the suggestions above for filtering the air should be helpful to remove insulation from the air.

It is also possible that gaps in seams of the HVAC system allow the introduction of insulation and other airborne particulate into the HVAC system from unfinished areas. For this reason all seams in the HVAC system should be taped and any gaps where sheet metal spans joists to act as a cold air return should be sealed with calking designed to retain its flexibility.

Insulation particulate in the indoor air can occur as a result of the breakdown of insulation within the HVAC unit or duct board that is sometimes used to make plenums and other portions of the HVAC system. Make sure the insulation or duct board within the system are not breaking down and allowing particulate to enter the occupied spaces.

The amount of skin fragments in the air sample from the command center is above the cited guidelines. Skin fragments combined with elevated humidity can result in dust mites. Although we did not test for dust mites, it should be noted that dust mites are a common trigger for asthma type symptoms.

Excess skin fragments are often a sign of diminished filtration. Controlling the humidity and improving the filtration can aid in reducing the possibility of dust mites.

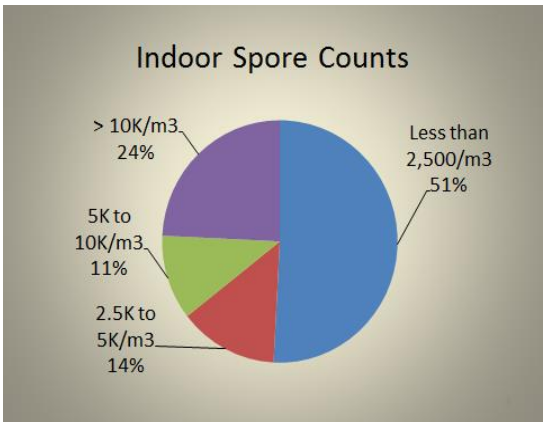
HVAC Systems

HVAC unit(s) in: An HVAC system is located in the HVAC Closet. The filter was placed in front of the return and there was an open slot on the front of the furnace allowing air to bypass the filter.

The filter in the HVAC system was inadequate for capturing mold spores or respirable particulate. The HVAC system should contain a filter with a minimum of a MERV 10 rating to capture spores and respirable particulate that enter from any source. Make sure that the HVAC system airflow remains adequate and change filters regularly to maximize efficiency.

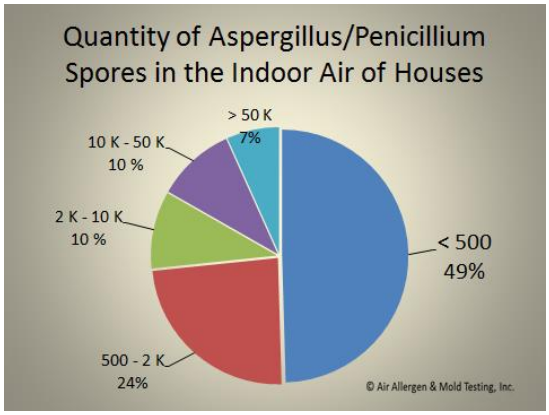
Interpreting Sample Results

The following pie charts are provided to compare your results with the results from more than five thousand other properties.



This pie chart shows the total indoor spore counts at other properties divided into four ranges. The median spore count is approximately 2,500 spores per cubic meter, most of which are outdoor spores like Basidiospores or Ascospores. The sample should contain no more than 500 Aspergillus/Penicillium spores per cubic meter.

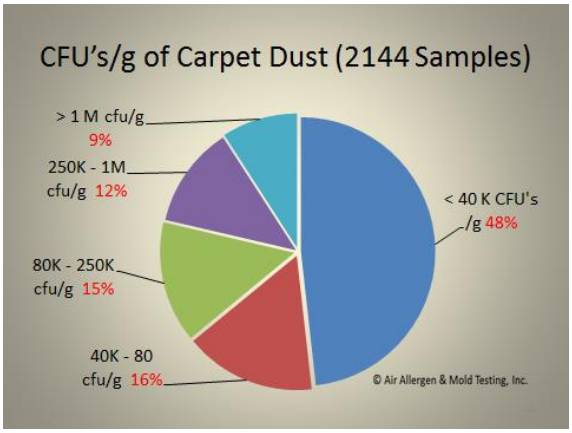
Outdoor spores that find their way indoors can be reduced by the filter in the HVAC system but require a minimum of a MERV 8 rated filter (or equivalent) for removal.



Elevated Aspergillus/Penicillium spores are an indication of mold growth indoors and can be the source of the musty smell associated with mold. Many people are sensitive to Aspergillus and Penicillium spores as an allergen, particularly the very young whose immune system is not fully developed, an older person whose immune system has grown tired, and those whose immune system is compromised by medication or disease. Some species of Aspergillus/Penicillium produce mycotoxins.

Elevated levels of Aspergillus and Penicillium are most often associated with elevated humidity and it is possible that the Aspergillus/Penicillium spore count will increase with the seasonal increases in humidity.

Cladosporium is the most common spore in HVAC systems and is often found on window and other surfaces affected by condensation. Cladosporium is generally believed to have a low potential to produce mycotoxins, but it can cause allergic reactions. Asthmatics and people who are immune-compromised should be especially wary of elevated levels of Cladosporium.

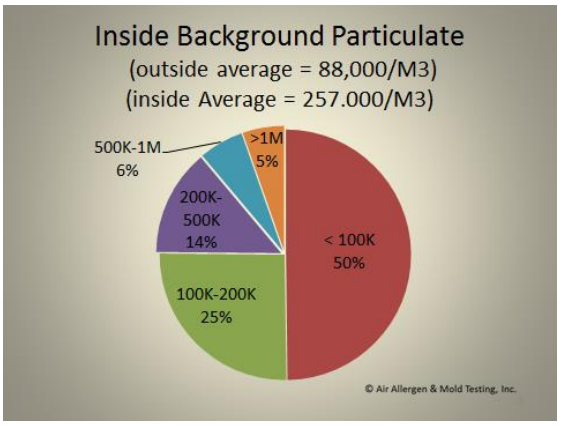


Water damage spores are associated with serious health concerns. For that reason, even small amounts are noted to encourage identification and elimination of all sources of high moisture or water intrusion.

Carpet dust analysis can give historical insight into intermittent events that can be helpful in managing the indoor air quality.

The Environmental Relative Moldiness Index (ERMI), which indicates whether a home is more or less moldy than average, is based on carpet dust. Studies show that health symptoms increase in homes where the quantity of spores in the carpet are higher than average.

Elevated background particulate can result in respiratory discomfort similar to allergy symptoms. Background particulate is removed by the filter in the HVAC system and can be reduced by improved filtration through the use of a higher rated filter and/or by operating the HVAC system fan in the ON position rather than AUTO. Air Allergen suggests a minimum of a MERV 10 filter to remove background particulate.



Maintaining Indoor Air Quality

Filtration:

The way to remove spores, skin fragment, insulation and other particulate that are in the air is through filtration. The HVAC system should contain a filter with a minimum of a MERV 10 rating to capture spores and respirable particulate that enter from any source. While higher rated filters can remove smaller particulate, the increased filtration may reduce airflow, and ultimately reduce filtration efficiency. Make sure that the HVAC system airflow remains adequate and change filters regularly to maximize efficiency.

If not already doing so, consider operating the fan of the HVAC system on continuous so that filtration occurs even when the thermostat does not call for temperature modification. Alternatively, consider adding air purifiers capable of capturing particulate down to one micron to help remove spores from the air during periods when the HVAC system is not in use.

Make-up Air:

In addition to mold spores and other particulate, indoor air may contain gasses and chemicals that can become concentrated and affect your health. The way gasses and chemical concentrations are reduced in the indoor air is through the use of what is commonly called make-up air. Make up air is required in large commercial office buildings for the same reason. A small amount of outside air is introduced into the cold air plenum prior to the filter. The introduction of the additional air results in the air being gradually turned over reducing the buildup of indo or pollutants. If your system does not already include make up air, consider asking your HVAC contractor about adding make up air to help manage your indoor air quality.

Humidity:

Mold growth and spore production is significantly retarded when humidity is held below fifty percent. Regular use of the HVAC system can be helpful to reduce humidity in the indoor air. However, if the HVAC system is not sufficient to maintain the humidity below fifty percent, consider adding dehumidifiers. Dehumidifiers can be arranged to drain automatically so they do not have to be manually emptied. If a drain is not readily accessible, a condensate pump can be attached to the side of the dehumidifier to pump the water to a drain.

Carpets:

Carpets have been found to be a significant source of spores associated with health complaints. There are three ways to manage the spore activity in a carpet. The first is regular and thorough vacuuming with a HEPA filter vacuum. The second is cleaning with a carpet safe fungicide and high extraction cleaning machine. The third is replacement.

If the decision is made to clean a carpet, use a carpet safe fungicide and a high extraction cleaning machine to minimize the moisture left in the carpet. Make sure the carpet dries quickly and thoroughly, using dehumidifiers if necessary, to prevent the regrowth of mold from any remaining spores due to moisture in the carpet. Consider having a carpet dust sample analyzed after the carpet is cleaned to determine whether the spore count is reduced to acceptable levels or if additional cleaning or replacement is necessary.

When the decision is made to replace the carpet, the floor beneath the removed carpet should be vacuumed, cleaned with a fungicide and treated to encapsulate any remaining spores. If the floor is concrete, consider painting the floor with a moisture barrier to reduce future condensation prior to installing new floor covering.

Pest & Odor Control, Cleaning or Remediation Chemicals:

Chemicals can cause respiratory and other health symptoms. If chemicals have been used in the occupied areas, the type and health effects of the chemicals used should be reviewed to determine whether they are contributing to the health concerns of the occupants. Chemicals can generally be removed by cleaning the carpets and wiping hard, non-porous surfaces with a damp cloth coupled with appropriate make up air.

Housekeeping:

All rugs, carpets and upholstered furniture should be regularly vacuumed with a HEPA filter vacuum to remove remaining spores. A vacuum cleaner without a HEPA filter will merely draw spores and other particulate from the surface and broadcast them throughout the area.

Hard surfaces should be wiped periodically with a mild fungicide, such as now contained in many dusting products, to remove any latent spores before they can find a suitable place to grow.

Note that mold spores can come in when the doors or windows are opened, and can also come in on clothing and shoes. The spore count can also vary as a result of changes in humidity and outdoor spore counts throughout the year. Having a spore free environment is not realistic; filtering the air within the building, regular use of a HEPA filter vacuum cleaner, good house-keeping, and preventing the growth of mold from any spores that do enter by controlling the humidity are keys to maintaining good indoor air quality.

Summary

The spore counts in the Command Center air sample were slightly above cited guidelines, with a significant number of water damage spores. The background particulate and the amount of skin scales in the Command Center air sample exceeded cited guidelines, suggesting a need for improved filtration in this area. The above information is offered to help manage the indoor air quality and reduce the future buildup of spores and particulate within the building.

Note the findings and recommendations in this report are believed to be accurate but are based on the research and guidelines published by others, so we are not able to guarantee the results adequately represent all matters relating to indoor air quality in any one circumstance.

In particular, the above report may not be sufficient to address all indoor environmental factors which may contribute to health symptoms. For this reason, if health issues are a concern, consider consulting with your health care provider about the contents of this report.

We are pleased to have you as a customer. If you have any questions or concerns, please call us at your convenience.

Respectfully,

Richard Johnson,
Air Allergen & Mold Testing, Inc.

General Information Concerning Mold & Other Particulate

It is important to make the distinction between mold and mold spores. Mold is a fungus similar to a plant, while mold spores are similar to the fruit of a plant. When mold is growing, it sends off mold spores to grow more mold, just as plants produce seeds to grow more plants. The spores become airborne and, when inhaled, can cause distress in the respiratory system.

Health symptoms associated with mold spores may include a cough, headaches, asthma and other respiratory discomfort, allergies, sore throat, sinus problems, depression, fatigue, and itchy eyes. The severity of health

reactions depends on the type of spore, quantity, growing conditions, and an individual's immune system response. Allergic reactions in airway passages can leave a person more vulnerable to bacteria and viruses.

Some spores contain small amounts of toxins. The concern about toxins varies according to the type of spores, quantity, and growing conditions. When toxins enter the blood stream they can travel to other organs and are believed to be associated with more serious health consequences.

Neither mold nor mold spores smell. The smell normally associated with mold is from the gasses given off when mold metabolizes the materials it is growing on. Therefore, if an odor normally associated with mold is detected, it most likely indicates that mold is growing somewhere nearby. The odor can vary from sweet to pungent, depending on the type of mold, the material it is growing on, and the growing conditions.

Individual reactions to different types and quantities of airborne mold spores vary widely, from inconsequential to life threatening. As a result, national indoor airborne spore count standards have not yet been agreed upon. Nevertheless, numerous government sponsored studies here and abroad over the past thirty years have trended toward similar conclusions about mold in the indoor environment.

Air Allergen has reviewed studies from a number of countries, states, and organizations who published guidelines over the past 30 years including the World Health Organization (WHO), Commission of European Communities (CEC), Finland, Germany, Singapore, Brazil, Czech Republic, Portugal, California, and Texas.

Some studies set a numerical guideline based on spore type. A study funded by the EPA called the Environmental Relative Moldiness Index (ERMI) based its health conclusions on whether the home was more or less moldy than average. Other studies concluded that any mold growth in the indoor environment is inappropriate. Still others conclude that interventions that combine elimination of moisture intrusion and leaks and removal of moldy items help to reduce mold exposure, respiratory symptoms and new onset asthma without addressing quantity or comparison with averages.

In addition to mold spores, the health of occupants can be affected by particles in the air. Particles can consist of dry solid fragments, solid cores with liquid coatings, and/or small droplets of liquid. Particulate exposure has been associated with increased risk of premature deaths, especially in the elderly and people with pre-existing cardiopulmonary disease. Other studies have linked particulate exposure to reduced lung function and respiratory symptoms in children, including the onset of asthma.

The significance and consequences of particulates in the air depends on the quantity, size, shape, and chemical composition. Angular shaped particulate, such as silica, can have an abrasive effect on the body, while other

particulate are shaped more like smooth pebbles. Materials like fiberglass are more difficult for the body's systems to break down and eliminate compared to cellulose and cloth, and therefore can be a greater irritant than those easily eliminated by the body's defense system.

Particulate can also include chemicals. One review of studies from 14 states identified 45 potentially toxic chemicals in the indoor air. Ten harmful chemicals were found in ninety percent of the samples including a known cancer-causing agent. The chemicals in second hand smoke are also referred to as particulate in the Surgeon General's report. Exposure to even small amounts of chemicals in combination with other chemicals, bacteria, and mold spores can lead to an amplified health risk.

Particulate are generally divided into three categories based on size; Inhalable, Thoracic, and Respirable. Inhalable means that it can be easily inhaled into the respiratory system. Thoracic particulate can find its way into the small air passages in the lungs. Respirable particulate are particulate that can enter the small air sacs in the lungs where oxygen is exchanged and are defined by the EPA as that particulate having a mid-point size of 4 microns. Respirable particulate includes many chemicals, second hand smoke, and many common mold spores which is the reason that harmful chemicals and toxins associated with mold can enter the blood stream through the lungs.

Given the body of available information Air Allergen currently refers to the following guidelines when considering the significance of samples taken during an inspection. *Humidity:* Less than 55% at 70 degrees. *Spore Trap:* (1), Spore type and percentage profile similar to outdoor air; (2), Total spore count under 2,500 spores per cubic meter, providing that Aspergillus/ Penicillium (high probability allergen) spores are under 500 spores per cubic meter; (3) No spores requiring wet conditions. *Carpet dust analysis:* (1), Total CFU's/gram under 40,000; (2), minimal spore types found on the EPA's Environmental Relative Moldiness Index (ERMI) list; (3), spores associated with elevated humidity less than 10,000 per cubic meter. *Background particulate:* (1) Total particulate count fewer than 100,000/cubic meter; (2), no insulation or glass-like fibers. *Skin Fragments:* 0-25 % of slide.

It should be noted that these guidelines are to be considered in the context of the inspection, indicating where steps can be taken to improve the environment and its effect on the health of the occupants. The farther the results of individual samples are from these guidelines, the more likely health symptoms will occur with the occupants.

Remediation Guidelines & Safety Precautions

All remediation generally follows these steps, the degree of which may vary depending on the level of contamination.

- Identify and eliminate any sources of water intrusion or high humidity.
- Prevent the spread of mold spores with containment when appropriate.
- Remove materials that cannot be cleaned.
- Kill the mold with a fungicide. Capture spores in the air with filtration.
- Remove remaining spores on hard surfaces by wiping.
- Remove remaining spores on porous surfaces, such as drywall or wood framing, by vacuuming, exhausting the vacuum outside.
- Seal any remaining spores on porous materials with an encapsulant.
- Vacuum, clean or replace rugs, furniture, or carpeting.
- Use personal protection appropriate to the level of contamination.
- Use people safe fungicides and encapsulants.

Goggles and a mask with an N95 rating should be worn when working around mold spores. Note that the mask will not protect the wearer from the effects of any chemicals used in the remediation process.

According to the EPA, mold contamination of less than ten square feet can be handled as normal maintenance. For contaminated areas between ten and one hundred square feet, plastic sheeting should be used to minimize air flow to other areas during remediation. For mold contamination in excess of one hundred square feet, additional containment and personal protection is recommended. You can find information regarding protection, containment and other issues at http://www.epa.gov/iaq/molds/table2.htm.

Though chlorine and water is commonly used as a fungicide to clean mold, it is not suggested for cleaning porous materials such as drywall, wooden joists or studs. Chlorine kills mold, but does not do well in killing spores. Chlorine evaporates faster than the water and the water left behind can provide moisture for the remaining spores to begin to grow. Chlorine is a strong oxidizer and can adversely affect the lungs of people exposed to the fumes.

Chemicals used during remediation such as fungicides, encapsulators, and moisture barriers should be investigated to assure that the residue or off-gassing of the material will not cause respiratory distress in the occupants. Consider contacting your Home Improvement or Janitorial Supply Store for recommendations as to products and their use.

Supply or return HVAC vents that service the area being remediated should be taped over during remediation to prevent contaminating other areas of the building. When remediating attics, basements, and crawlspaces that contain HVAC systems or ductwork, all seams in the HVAC system should be taped and any gaps where sheet metal spans joists as a cold air return or where the ductwork enters occupied areas of the building should be sealed to prevent air from the unoccupied areas from entering the occupied areas.

When using containment, a negative pressure should be created in the area being remediated when compared to the rest of the building. This will cause airflow from uncontaminated areas to go in the direction of the area being remediated to limit contamination in the rest of the building.

Although exhausting air scrubbers to the outside to create negative pressure is applicable in some circumstances, air scrubbers exhausted outside can draw air from wall cavities and other places that can further contaminate the work area. Instead of exhausting a large air scrubber outside, consider placing a low speed box type fan directed outward through a window in the area being remediated that draws air from uncontaminated area to replace the exhausted air. Make especially sure that access to crawlspaces, attics and unfinished basements outside of the work area are sealed to prevent air in areas not served by the HVAC system from being drawn into the work area.

Make sure all causes of water intrusion or moisture damage are properly repaired before remediation is initiated. Porous materials, such as drywall, wood studs, plates, wood floors and other plywood surfaces should be encapsulated after cleaning and prior to reconstruction to provide protection against remaining embedded spores beginning to grow when conditions are favorable.

Drywall or other materials with a light dusting of mold can be wiped with a mild fungicide and vacuumed with a HEPA filter vacuum. Drywall or other materials with obvious visible mold should be cleaned with a fungicide, lightly sanded, vacuumed with a HEPA filter vacuum, and sealed with an encapsulant.

Drywall or other materials with significant mold or water damage as a result of being wetted from the opposite side or flooded should be removed to a point approximately two feet beyond any visible mold or water damage. Insulation that has been wetted or is adjacent to wetted and damaged building materials should also be removed. Baseboards and other trim can be removed to inspect behind the removed trim for mold and water damage.

If removing drywall or other materials from ceilings, walls or floors exposes the area being remediated to another area, both areas should be remediated or provisions should be made to prevent air from the un-remediated area to flow toward the area being remediated.

Surfaces behind any removed materials, such as the backside of an opposite wall, wall studs, base plates, sub-flooring and joists, should also be wiped with a mild fungicide and vacuumed with a HEPA filter vacuum, exhausting the vacuum to the outside air. Surfaces with obvious visible mold or that are slightly damaged should be vacuumed, lightly sanded, cleaned with a fungicide and treated with an encapsulant. A surface with significant mold or mold damage should be replaced.

For vacuuming spores and other particulate from the work surface, use a vacuum cleaner with a HEPA filter. A vacuum cleaner without a HEPA filter will not capture mold spores and respirable particulate. Even with a HEPA

filter, consider exhausting the vacuum outside of the building so that any spores that do make it through the filter are not reintroduced into the remediated area or disturb other spores until they have been vacuumed. HEPA filters and exhaust extensions for shop type vacuums are available through janitorial supply stores as well as many home improvement stores.

After treatment and encapsulation, operate the air scrubber for twenty-four to forty-eight hours with the windows closed to remove any remaining spores. Air scrubbers should be turned off at least twenty-fours prior to taking clearance samples.

Studies Relevant to Indoor Air Quality

Concentrating on the indoor environments is particularly important for children, since they can spend as much as 90% of their time indoors. Exposure to indoor air pollutants can cause health effects ranging from sneezing and coughing to exacerbations of chronic respiratory disorders such as asthma. *American Thoracic Society May 2010*

Three recent, high quality, systematic reviews of the available evidence concluded that the implementation of interventions that combine elimination of moisture intrusion and leaks and removal of moldy items help to reduce mold exposure, respiratory symptoms and new onset asthma. This position has also been taken by the National Institute for Occupational safety and Health (NIOSH), many State governments, Health Canada, and internationally by the World Health Organization*. Position Statement on Mold and Dampness in the Built Environment by the American Industrial Hygiene Association March 26 2013*

More than 50 epidemiological studies have been performed in different parts of the world. The majority of the studies have found adverse health effects from particulate matter at levels lower than the current federal standard. Particulate air pollution has been associated with increased respiratory illness or chronic respiratory symptoms, asthma aggravation, increased hospital admissions, and premature deaths. *The American Lung Association.*

Researchers pooled data from 26 peer-reviewed papers and one unpublished dataset that analyzed dust samples taken from homes in 14 states. They found 45 potentially toxic chemicals that are used in many consumer and household products. Ten harmful chemicals were found in ninety percent of the samples including a known cancer-causing agent called TDCIPP. Exposure to even small amounts of chemicals in combination can lead to an amplified health risk, especially for developing infants or young children. *Milken Institute School of Public Health (Milken Institute SPH) at the George Washington University 2017*.

Inexpensive, low-efficiency HVAC filters offer no better particle removal than no filter. *Effectiveness of Air Filters and Air Cleaners in allergic Respiratory*

Diseases: A review of the Recent Literature by James L. Sublett, National Center for Biological Information July 2011

Dampness and mold in homes is associated with increases in several adverse health effects including upper respiratory symptoms, cough, wheeze and asthma exacerbation. *Indoor Air Quality Scientific Findings Resource Bank by the Indoor Environment Group of the Lawrence Berkeley National Laboratory with funding support from the U.S. E.P.A.*

Children living in a high ERMI value home at 1 year of age had more than twice the risk of developing asthma by age 7. *Annuals of Allergy, Asthma, & Immunology July, 2012*

Housing dilapidation, especially the damage caused by water leaks, is directly linked to the rates of poorly controlled asthma in inner city children. Remediating water damaged buildings has improved the control of childhood asthma. After remediation, emergency room visits and hospitalizations were reduced from 22 visits and 11 admissions to 2 visits and one admission. A reduction in the dosage of medications was possible in all patients and, in some cases, certain medications were taken off following the intervention. *Journal of Asthma 2012*

Bedrooms with higher levels of particles were linked to more symptoms in the children with asthma. As the concentration of coarse particles got higher, the symptoms increased. Symptoms included coughing, wheezing and chest tightness. This study suggests that finding ways to cut down of the particulate matter in the air may help to reduce the symptoms of children with asthma. *Meredith C. McCormack, MD, MHS, an instructor with Johns Hopkins School of Medicine and researchers from the Center for Childhood Asthma in the Urban Environment, which is a joint center of Johns Hopkins School of Medicine and John Hopkins Bloomberg School of Public Health. August 2009*

Forced air systems with high efficiency filtration were found to provide the best control of asthma triggers: 30-55% lower cat allergen levels, 90-99% lower risk of respiratory infection through the inhalation route of exposure, 90-98% lower environmental tobacco smoke (ETS) levels, and 50-75% lower fungal spore levels than natural ventilation, portable air cleaners and forced air ventilation equipped with conventional filters. *Environmental Health, August 2008*

A study of the mortality-related benefits and costs for improvements in particle filtration in US homes and commercial buildings done at the Lawrence Berkeley National Laboratory determined that improved particulate filtration resulted in reduced mortality rates and economic benefits always exceed costs with benefit-to-cost ratios ranging from approximately 3.9 to 133. *Lawrence Berkeley National Laboratory, March 2017.*

Attachment: Detailed Lab Report